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ABSTRACT

The development of training materials on project management for local education agency personnel involves a series of four steps. The first step, the analysis phase, was reported in Technical Memorandum No. 1. This second step, the conceptual phase, was conducted to provide a statement of performance and/or behavioral objectives for the subsequent design and development phases. The purpose of this memorandum is to present the results of the staff activities involved in the conceptual phase and to focus on the presentation of a statement of instructional objectives. The report consists of two main sections. The first outlines the instructional setting by focusing specifically on the conditions that affect the operation of project management in the local agency level. The primary ideas in this section deal with a precise description of the target audiences involved for the two proposed training programs. The second section presents the statement of behavioral objectives developed from task analysis of project management positions. Appendixes contain information on training films and on behavioral objective performance measurement criteria. (Author/IRT)

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IDENTIFICATION OF CONDITIONS AFFECTING PROJECT MANAGEMENT IN THE LEA AND ESTABLISHMENT OF BEHAVIORAL OBJECTIVES FOR PROJECT MANAGEMENT TRAINEES

Technical Memorandum No. 2

Project Management Training Packages for
Local Education Agency Personnel

RF Project No. 3131-A1

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I. INTRODUCTION

The development of training materials on project management for LEA personnel involves a series of four steps. The Analysis Phase, already completed, was devoted to a review and examination of the function of project management and the role of the project director in the local education agency setting. Technical Memorandum No. 1 presented the results of the Analysis Phase.

Based upon that review, a Conceptual Phase was conducted to provide a statement of performance and/or behavioral objectives for the subsequent Design and Developmental Phases. The purpose of Technical Memorandum No. 2 is to present the results of the staff activities involved in the Conceptual Phase and focuses upon the presentation of a statement of instructional objectives. The report consists of two main sections. The first section outlines the instructional setting by focusing more specifically than heretofore upon the conditions which affect the operation of project management in the LEA. The second section of the report presents the statement of behavioral objectives for the Project Director Seminar and Executive Orientation Seminar developed from the analysis of project management tasks.

II. SOME CONSIDERATIONS IN THE LEA SITUATION

The primary ideas contained in this section of the report deal with a more precise description of the target audiences involved for the two proposed training programs. These descriptions are followed by a review of possible applications of the project management concept in the LEA. The next elements to be presented are several considerations and constraints relative to the implementation of a project management capability in an LEA. Recognizing the need for further training as a case for continuing professional development, a brief review of additional training materials is presented along with agencies that could provide information and assistance with regard to the establishment of a project management capability in an LEA.

A. Description of Target Audience

1. Project Director Training Seminar

The target audience for this seminar will be those individuals in an LEA who occupy positions represented by one or more of the following characteristics:

1) A non-teaching certificated employee of a school district (e.g. research specialist, psychologist, librarian).

2) School district administrative/supervisory personnel who are working in a specialty field with which they have had administrative or teaching experience (e.g. curriculum director, subject area supervisor, building principal).

3) Current and newly appointed project directors of federally or locally funded projects.

4) A teacher whose known future assignment will be that of a full or part time project director.

5) A person who has not had significant training nor experience in management or administration but who is recognized as having potential as a project director.

2. Executive Orientation Seminar

The target audience of this seminar will be those individuals in an LEA who have prime authority and responsibility or are influential in making the decision to implement a project management capability and who can provide financial and organizational support to the capability. Such individuals would customarily hold positions or roles such as the following:

1) Superintendent, Assistant Superintendent, Deputy Superintendents, etc. of Schools

2) School Board Members

3) Director of Office of Federal Programs

4) Director of Research

5) Director of Planning and Evaluation

6) Business Manager

B. LEA Activities Amenable to Project Management

The activities within the LEA known as projects refer to those activities which have a definite start and completion date, a specific

end product or goal, a definite life cycle, and defined time, cost and performance requirements. Operations carried out under the various federally funded Title I, II, III, IV and VII programs would be considered as projects under this criteria.

Over and above known federally sponsored projects are many and varied activities in the LEA which are amenable to project management. Examples of such activities are listed below:

1. Finance and Budget
   - the preparation of an annual budget for functional areas.
   - development and conduct of a voter orientation plan for a bond or operating levy.
   - investigation, procurement and installation of a data processing system for business, instructional or student management.
   - development of procurement policies for busses, maintenance services, and other capital equipment.
2. Curriculum Development
   - implementation of an innovative instructional program.
   - action research program development as a part of classroom teaching techniques, such as a demonstration of student role playing.
   - development of a special extra-curricular activity such as a hockey team, gymnastics club, dramatics club, soccer, lacrosse, etc.
   - text book selection

- grade card revision
- test construction
- curriculum reorganization

3. Inservice Faculty Programs
   - development of an inservice training program for self evaluation.
   - development of an inservice program for a team teaching situation.
4. Miscellaneous Operational Programs
   - institute EDP in the personnel, finance, and educational evaluation department.
   - develop maintenance programs
   - specification development for new facilities, or modernization of present facilities.
   - manage the construction of new facilities.
   - school system goals assessment and development.
   - investigations of school decentralization or centralization.
   - develop bussing plans.
   - investigations concerning minority participation on school boards and teaching staffs.
   - selection of a group insurance plan for the LEA.
   - the organization of a credit union in the LEA.

C. Requirements for Incorporating Project Management in LEA's

To address oneself to the question of defining the requirements for installing a project management capability in the LEA requires that this capability be defined. Simply stated, a project management capability means that organizational structure and processes are established and set up in such a manner that certain types of activities nominally called projects can be adequately planned and executed. This capability does not necessarily mean that all of the organization's activities would be organized and carried out in a project format.

To have a project management capability in an LEA means that there is a defined organizational center and personnel who can identify projects, develop proposals for reaching specified objectives and carry them out or assist in carrying out the execution of the project. It means that there is a capability of response within the organizational structure. The response center is known, identified, and functions.

To install a project management capability as defined above requires the LEA to address itself to the following requirements:

1. Commitment. Probably the prime and foremost requirement for a project management capability is a commitment on the part of the administration to have such a capability within the local education agency. This requirement means that the board of education, the superintendent, and his subordinates recognize the value of and the need for project management within the organization. What needs to be developed primarily at this level is an attitude receptive to project management concepts. Knowledge must exist with regard to the advantages and limitations of project management but detailed skills regarding its application are not to be highly stressed.

2. Staff Acceptance. Given that the top level administration commits itself to the project management concept, there also needs to be an acceptance of the concept by those persons and agencies within the organizational structure who are most likely to be called upon to implement project management in the LEA. Unless there is acceptance and understanding at this level, an effective capability will not be developed. The value and strengths of project management in appropriate situations must be stressed.

3. Training. As with the introduction of any new innovative idea, some type of initial and continuing education or training program must be developed. An initial training program might focus heavily upon person-to-person relationships with individuals already knowledgeable in project management. Such relationships might take the form of workshops, seminars, as well as consultation on individual projects. As the present staff develops competence in the techniques and procedures of project management, there can be a reduction in the amount of face-to-face training and more emphasis put upon the development of training materials which can be available to newly assigned project directors. There exists a need for a specialist on the staff to conduct training sessions and serve as a resource person but training materials should be made available on a general distribution basis. A possible alternative might be to establish training centers to which persons come for either initial or refresher training.

4. Policies and Procedures. The installation of a project management capability requires that a series of policies or decision rules and specific procedures, standard operating procedures, and program manuals be developed. These policies and procedures would cover such items as the type of situations to which project management would be applied, methods of reporting,

development of project budgets, development of work flows, and similar items. Some mechanism must be developed to clearly identify the authority and responsibility of the project director. This might take the form of a project charter. These manuals would enable the organization to have a common means of communication and direction. Without doubt, the development and installation of these procedures would require considerable effort.

5. Organizational Adaptation. Project management capability requires flexibility and adaptability within the organizational structure. In most cases, projects cut across existing or established functional lines. Because of competing demands, conflicts arise with regard to authority and responsibility of project directors versus department heads. Top level administration must be aware of this potential problem and develop timely means of dealing with difficulties when this occurs. Recognition must be given to the fact that established functions may change, enlarge, or be modified in some form because of the presence of projects in the organizational structure. A good example of this modification would be the enlargement of sections on evaluation and research commonly seen in public schools due to the increase in federally funded programs and projects.

6. Assessment. Having a project management capability means that there is also a mechanism or procedure for assessing the effectiveness of that capability itself. Questions that continually need answers are: Is this type of capability paying off? Is there a cost-to-benefits problem? If a project management capability is developed are we possibly developing a Cadillac solution to a Volkswagen problem? A continuous

program and effort must be carried on to determine the effectiveness of the capability. This requires that criteria be established for determining the value and success of the capability.

7. Purpose. While appearing last on the list of requirements, the goal, objective, or purpose of having a project management capability must be clearly and openly identified. Why is it wanted? What is it intended to accomplish? Do we simply want a better way of planning and executing a project? Do we want a better way of allocating available resources to programmatic efforts and project efforts? Do we want a better system of time estimation or project execution? Do we merely want a system to comply with federal requirements for adequate project planning and evaluation? Several objectives may exist but what essentially is the basic purpose? Without answers to these questions, the previous six requirements cannot be effectively addressed.

To summarize, a project management capability means that the organizational structure has a capacity to deal with those types of activities commonly referred to as projects. To do this means that there must be knowledge of project management and conviction that it is the most effective means of providing solutions for change in the LEA. Failure to meet any one of the above requirements will create a constraint upon the project management capability. The lack of experienced project management-oriented personnel in the LEA's necessary to train others, prepare policies and procedures, investigate and assess project management needs, creates an additional constraint. To help alleviate a lack of knowledge, some suggested sources of information are provided in the following section.

D. Additional Training and Experience Sources

The need for continued professional development in the changing educational field is readily recognized and to assist in filling this need, the following are identified as project management information resources.

1. The Federal Government, under the sponsorship of the U. S. Department of Health, Education, and Welfare, Office of Education and particularly the Bureau of Research has provided grants for the development of training programs for educational management. Project to Advance Creativity in Education (PACE) program which provided the funding for the report, A Comprehensive Model for Managing ESEA Title III Project from Conception to Culmination, and the Preparation for Educational Planners Program (Operation PEP) are examples of federally funded programs. The monograph titled Program Evaluation and Review Technique Applications in Education developed at The Ohio State University, Educational Program Management Center (EPMC) is another effort directed toward project management techniques as applied to the educational field funded by the Office of Education.

Other than federally funded effort very little project management information in the form of published books as applied to an educational setting is available. However, some independent effort was created by individuals such as Dr. H. J. Hartley, author of Educational Planning-Programming-Budgeting: A Systems Approach (Prentice-Hall); Dr. D. L. Cook, author of the monograph PERT: Applications in Education (Charles Merrill); and H. W. Handy and K. M. Hussain, authors of Network Analysis for Education Management (Prentice-Hall).

A myriad number of documents dealing with the subject of program or project management have been developed for industry and particularly for the aerospace industry. A transfer of these developments in project management from industry can be made to the educational setting since it is the technique or the method as a tool that is to be utilized. The techniques for planning and flow charting plus the discipline of PERT are examples of management tools which have wide application.

2. State Educational Departments that disburse federal education development funds have prepared policies and procedures for utilizing these funds through the LEA's, such as the Guidelines and Preliminary Applications Instructions prepared by the New Jersey State Department of Education. Similarly the Ohio Guidelines for Title III, ESEA, approved by the U. S. Office of Education, provides the conceptual framework for developing and implementing a state-operated Title III program.

3. Colleges and Universities are one of the finest sources of information and training for project management. Some institutions have developed courses dealing with the various facets of management in education on the undergraduate and graduate levels, such as Principles and Process of Educational Planning, School Finance, Planning Educational Facilities, Educational Administrative Control Theory, and Planning, Programming and Budgeting in Education. Some universities have even developed special research groups or centers for soliciting funds and contracting for the development of management training materials and training courses in education. Specialists in various facets of management development and training are generally available on a consultant or advisory basis. References to books, bulletins, training films (see Appendix A), and

training courses are also made available from these institutions of higher education.

4. Professional Education Associations have also recognized the need for information and training for project management and have provided their membership with reading material, sound tapes, films and training sessions. Examples of these organizations are the local state associations of education, school board associations, and school administration associations.

5. Business Management Associations, Correspondence Schools and Consultants have all been active in providing industry with the necessary training and tools for management. They have however recently directed their effort to the field of education due to the substantial amount of federal funds made available. These organizations are having some difficulty in identifying with the needs of the educational setting and its need for project management. A few examples of these organizations are Booz, Allen & Hamilton, Battelle Memorial Institute, American Management Association and Extension Institute, National Management Association, Alexander Hamilton Institute, and Project Management Institute.

6. The Local Educational Agency is a good source of knowledge available to the prospective project director. This knowledge however is in the form of experience which can be gained by becoming involved with directing, motivating, communicating and coordinating peoples' activities. This form of knowledge is not formal in the sense of being acquired from a book. It was observed in the interviews of LEA personnel that any business experience or experience in dealing with people was considered an asset to a project director.

An overview of the above resources and the information provided by these sources yields the observation that only fragmented educational project management information is available. Courses in planning, budgeting, accounting, tools for planning, organization, guidelines for proposal development and decision making are all examples of a partial treatment of the total program necessary for training project directors in education. At the present time, there is only one major reference dealing directly with project management in education (cited previously) - Educational Project Management* by Desmond L. Cook, published in 1971.

*Published by Charles E. Merrill Company, 1300 Alum Creek Drive, Columbus, Ohio.

III. TRAINING OBJECTIVES

The purpose of this section is to present a statement of instructional objectives expressed in trainee or participant behavioral and/or performance form which will serve to direct the subsequent Design and Development phases. Primarily, the objectives will serve as the basis on instructional materials to be developed for the trainees.

Perhaps one of the most overworked yet necessary concepts in the field of education at the present time is that of "behavioral objectives." Numerous writers have developed excellent discussions of the topic. Among those consulted in preparation of the stated objectives were Mager, Smith, and Scanlon.

One observation made after an examination of several sources is that there appears to be no one common or standard form in which behavioral objectives should be stated. This may be desirable since it is quite possible to become too involved with form rather than with content. The decision rule employed by the project staff was to focus on content first and then develop form. In developing the objectives, the guiding rule always was - What should the trainee be able to do at the end of the training session? In some cases, this has led to a degree of editorial inconsistency of the objectives statements within the various sections. The statement of trainee objectives should be considered as tentative and undoubtedly will be subject to revision as the next two phases are considered.

This section presents initially a task analysis and the training objectives developed for the role and function of project director or manager. This presentation is followed by a task analysis and the training objective developed for top level administrative personnel having respon-

sibility for developing and installing a project management capability in an LEA.

A. Task Analysis of Project Management

Two major steps were involved in the process of developing the objectives statement. First, materials from the Analysis Phase dealing with the duties, responsibilities, and operational activities of the project director and/or manager in the LEA were reviewed. Second, a mission analysis of project management was created. The general framework for this analysis was developed by structuring the principal missions which are carried out directly by the project director. While some of the tasks described for the project director may in fact be delegated to others for actual accomplishment, he is ultimately responsible for their achievement.

The detailed task analysis required (a) the examination of the action phrases for relevancy to educational projects and (b) the development of a model which permitted sequencing of the various phases of project management. The conceptual model is presented as Figure 1 (Mission Analysis of Project Management). Examination of Figure 1 will reveal that four principal phases were delineated - 1) Planning, 2) Implementation, 3) Operational Control, 4) Termination Phases. Using these four phases, a mission and detailed task analysis was then made.

The task analysis required the statement of a set of assumptions concerning the experience and training background of the person performing the role of project director. He is assumed to have:

1. A college education
2. Knowledge in the educational field
3. A capability of relating to other humans

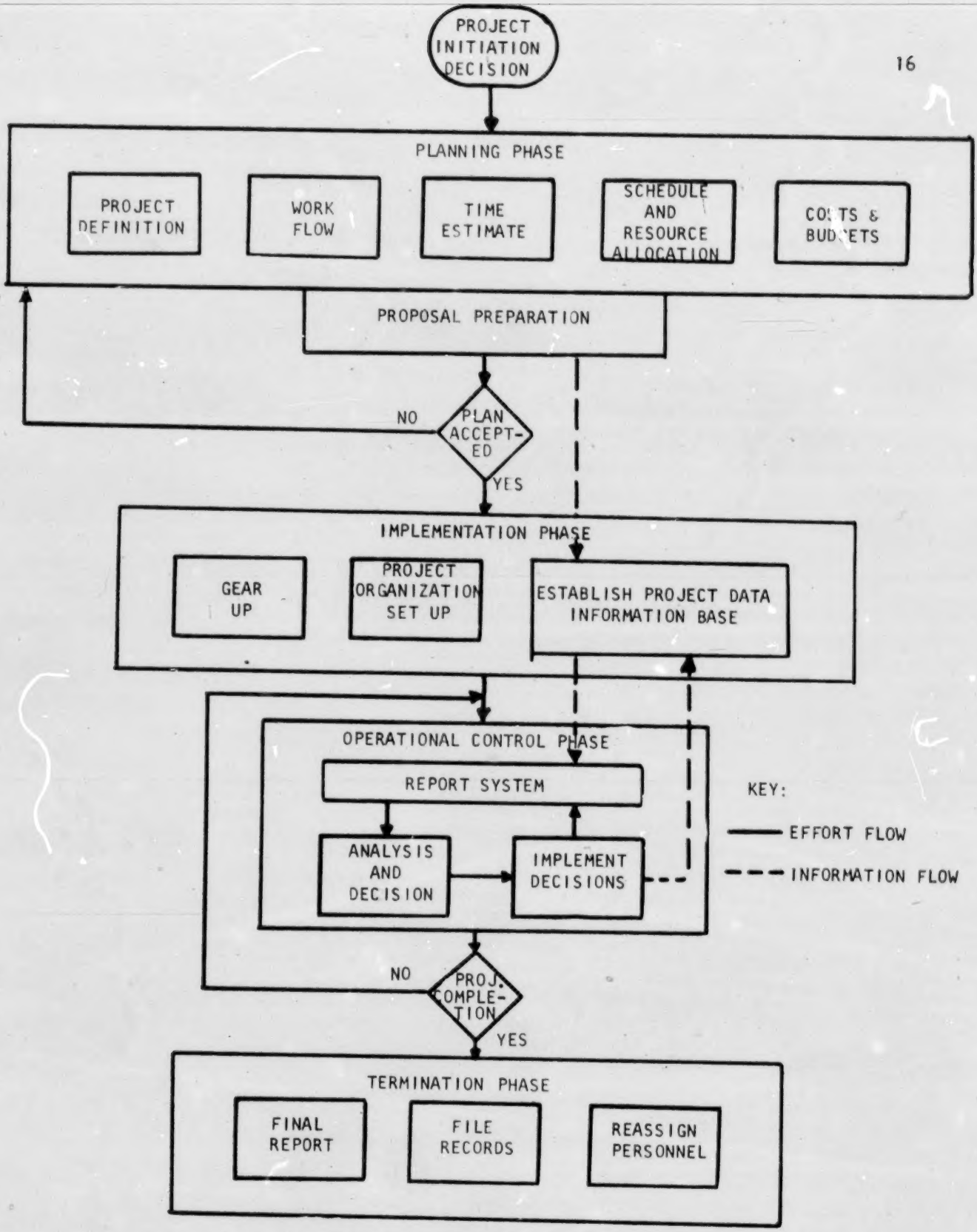

Figure 1. Mission Analysis of Project Management

4. Tools and skills to conduct problem solving activities.
5. Technical writing capability
6. Knowledge of public relations
7. Organizational and motivational capability

The task analysis sections are identified by the four phases of project management shown in Figure 1. These phases are broken down into missions which in turn are reduced to tasks.

1. Planning Phase

a. Project Definition

1) Identifies and establishes a broad project goal.

2) Breaks down the project goal into sub-goals (missions) and breaks down the missions into sub-missions (tasks).

3) Demonstrates understanding of the principle that at the lowest levels of the goal hierarchy the wording of a statement changes from to do something to specifying that something is accomplished.

4) Specifies for each task the conditions under which the performance is measured and the acceptability standard for the performance.

5) Creates a work breakdown structure document including a chart which contains the goal, missions, and tasks arranged in hierarchial order.

b. Work Flow

1) Draws a pictorial sequence (flow chart) which logically connects the tasks (activities) and

events (identified as a point in time when something starts or is completed).

2) Checks for complete and orderly flow chart logic by tracing an example sequence of activities through the flow chart.

3) Rearranges the sequence and flow logic of the tasks so that the work accomplishes the overall goal by employing one or more of the following alternatives:

- add tasks (steps) to the flow
- remove tasks (steps) from the flow
- add decisions into the flow
- subtract decisions from the flow

4) Designates from the flow chart those events (start or completion of an activity) which are milestones as identified by one or more of the following:

- important event to the project
- gathering point of several activities
- point of divergence for several activities
- useful event for control purposes
- a somewhat arbitrary designation

5) Is able to translate a work breakdown structure into a logic flow chart complete with milestones

c. Time Estimation

1) Makes use of reference materials or consultants

to obtain information on manpower/skill work rates.

2) Estimates the time required for task accomplishment by determining:

- types of skills needed (assuming all types are available).
- an average ability level and work rate for each skill.
- zero activity time between work performed by several persons.

3) Estimates a "best" time for task accomplishment for each task of the flow chart by applying an effective resource application rate to required times for these tasks.

4) Estimates total project (goal) time using some combination of the following:

(a) adding times for all tasks

(b) adding times only for those tasks which fall along the longest path of the flow chart

(c) using own past experience or experiences of others to estimate either a total project time or various mission completion times

d. Resource Estimation and Scheduling

1) Estimates the resources necessary for the accomplishment of each task. He details these resources under the following headings:

- facilities needed

- skills needed
- indirect costs
- materials and supplies needed
- equipment needed
- specialized services (computer, printing, consultants) needed

2) Makes up project-task-event calendar using project start date, logic flow chart, task accomplishment times, and total project time.

3) Establishes a set of nominal codes for the resource items required for the project.

4) Combines the task resource requirements with the project-task-event calendar using the nominal codes. (This calendar becomes the project-task-event resource)

5) Determine the high and low counts for each resource item at various times across the calendar.

6) Using the project flow chart and the project-task-event resource calendar he adjusts the task events which are time flexible so as to fully utilize the resources and to accomplish a somewhat uniform rate of resource utilization (minimize and spread evenly the concomitant resource requirements by reducing the high counts of resource items and increasing the low counts).

7) Determines the extent to which several types of skills can be combined into a single skilled person so as to utilize a single coded resource on the 'calendar' instead of several.

8) Establishes a commonality table of resources using the 'calendar' where additionally required resource items are added to the table but common items are not.

9) Determines the lead time required for the acquisition of each type of resource or skill.

e. Cost Estimates and Budget

1) Operates within various federal, state, and local guidelines concerning expenditures and budgets.

2) Modifies the 'calendar' with a new code for the combined skills person.

3) Determines the full time, part time, or on consultant basis skill persons required by checking the modified 'calendar' for skill resource code lines.

4) Obtains information on salary/wage/fee rates for the required skilled persons and costs of fringe benefits.

5) Costs out the salaries, wages, and fees for personnel resource requirements for the project.

6) Costs out fringe benefits, personnel travel expense, and other expenses.

7) Investigates and considers the local school system for availability of personnel skills required.

8) Determines indirect costs for the project by either applying a percent to total personnel costs or by specifying an amount.

9) Determines costs associated with required facilities using commonality table.

10) Establishes criteria for examining cost/benefit of rent as purchase of equipment.

11) Investigates and determines costs associated with needed equipment using commonality table and LEA availability.

12) Determines cost of materials and supplies.

13) Determines cost for contracted services (computer, printing/reproduction, consultants) using commonality table and LEA availability.

14) Establishes an expenditure plan (budget) which is a single document that lists all cost estimates.

15) Creates an expenditure schedule that plans for distribution of resources over the total project by one of the following:

- along functional lines
- by tasks or missions
- by time periods under a function
- by time periods (weeks, months)

16) Recognizes that some constraints on expenditure schedules and rates are imposed by federal, state and local regulations.

2. Implementation Phase

a. Gear Up

1) Realizes that it is necessary to have personnel and resources on start up date.

- it takes time to acquire facilities, personnel, and other resources.
- the school year could restrict some of the gear up activities.

2) Creates a plan for gear up.

- determines acquisition dates by applying lead time to first activity dates for personnel and resources.
- creates the document containing the information.

3) Executes the gear up plan.

- hires personnel according to skills.
- makes arrangements for facilities.
- arranges for purchase (rent) of equipment and purchases materials for delivery on desired dates.

4) Fits project organization into existing LEA structure.

- establishes interpersonal relationships across functional lines in an attempt to get acceptance of the project.
- obtains support and authority from top management.

(This implies leadership, human relations and public relations).

b. Initial Organization Activity

1) Designs, sets up, and initiates a project information system for the project.

- establishes the information requirements for supporting the plan.
- designs measurement instruments to obtain data.
- establishes administrative measures
- makes up criteria items for analyzing and evaluating the data (putting value on data to obtain usable information).

2) Delineates responsibility for personnel.

3) Organizes the staff into a control and communication hierarchy.

- knows about organizational structuring (line, line-staff, functional).
- recognizes the range in directing-motivating activity.
- conducts meetings effectively.

4) Establishes the administrative routine, policies, and procedure statements.

3. Operational Control Phase

a. Initial Operations

1) Starts work-action on plan.

- understands that control operations are an (continuous recycling) iterative process.

b. Analysis and Decision

1) Compares the actual performance, work schedule and expenditure rate with the corresponding plan.

2) Recognizes deviation from the plan.

3) Recognizes the significance of the deviation from the plan.

- establishes for himself a set of values and criteria to judge significance and establish priorities for change.
- considers the interrelationships of performance, schedule and cost.

4) Develops several alternative courses of action involving the trade off of performance, schedule and cost.

- modifies the information collection system to more accurately describe the operation.
- modifies the objectives within the contract constraints so as to allow accomplishment of the overall goal.
- modifies the plan so as to reduce the difference of the plan to the operation.

5) Makes a decision from the alternatives and his set of criteria.

6) Creates a plan for the implementation of the decision.

c. Control

1) Executes this planned action of the decision (selected alternative).

- recognizes the first step and initiates the activity involved.
- recycles through the same steps of control paying particular attention to these changes in plan.

d. Report System

1) Initiates and controls data collection on work activity by reports, observations, discussion, staff meetings and literature.

2) Creates a status and action report listing the information, alternatives, and decision to distribute to the contracting body for information and possible approval and to the project personnel to inform them of the changes made to better achieve the overall goal.

e. Completion

1) Understands that upon completion of the last activity of his work flow plan the overall objectives have been accomplished and the project is completed.

4. Termination Phase

a. Final Report

1) Prepares necessary and required final reports for the project and duplicate copies for file, contracting

agency, and dissemination to sources such as ERIC if acceptable to contractor.

b. File Records

1) Purges project files of unnecessary materials and items.

2) Assembles and stores those records of project which are required to be retained by contractor and parent organization.

c. Reassign Manpower and Facilities

1) Works with functional organization units in arranging for disposition of project personnel by seeking other assignments within organization.

2) Releases facilities and equipment to parent organization or to other projects as directed.

B. Behavioral Objectives and Performance Evaluation Criteria

The task analysis was established and utilized in the preparation of the behavioral objectives for the training seminars. It should be noted that in some cases certain tasks are not included in the behavioral objectives statement since it was felt that such tasks were beyond the intent or scope of the proposed training sessions. In a sense, they represent the dimensions of an advanced course in project management.

Concurrent with the development of the behavioral objectives for both seminars was the establishment of the various measures of performance which seem appropriate. Because there will be trade-off decisions concerning the type of performance measurement used with each behavioral

objective, the format used in listing these objectives incorporates a performance measurement chart. This chart allows for up to seven types of performance measurements to be associated with each behavioral objective. These types of performance criteria are:

- Single person mental formulation of a verbal answer (mental verbal).
- Single person discrimination between alternative selections presented (test).
- Single person paper/pencil formulation of a verbal answer (list).
- Single person paper/pencil formulation of verbal and symbolic answer (self chart).
- Group verbal response interaction (group verbal).
- Group response with a paper/pencil verbal and symbolic answer (group reporting).
- Group role playing response (simulate).

1. Project Director Seminar Trainee

The trainee behavioral objectives are delineated using the task analysis statements describing the role of project director. These behavioral objectives include an action verb indicating what the trainee in a project management seminar will be doing and the conditions under which he is to perform.

The standard of performance acceptable for successful completion of the objectives will be developed concurrently with the training course content. Appendix B presents a summary of the performance measurements for the project manager seminar. The table allows for the viewing of

groups of behavioral objectives associated with a common performance measure. This examination can then permit the trade-off of instructional schemes and performance measurements.

	BEHAVIORAL EVALUATION TECHNIQUES						
	Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simu-late
a. Project Definition							
1) states a broad, overall goal statement when given a situational description.			x			x	
2) creates the breakdown of a given goal into sub-goals (called missions) and missions into sub-missions (called tasks), and if further delineation is necessary, tasks into sub-tasks.			x			x	
3) discriminates between a mission which indicates something to be done and a task which is something being accomplished when given a mixed list of missions and tasks relating to a situational description.		x			x		
4) lists for a given task the conditions under which the performance is measured and the acceptability standard for the performance.	x		x		x	x	
5) creates a work breakdown structure document including a chart which contains the goal missions and tasks arranged in hierarchial order when given a situation description and goal.				x	x	x	x
b. Work Flow							
1) draws a flow chart which logically connects a given set of related tasks.				x		x	
1.1. cites standard flow chart symbols and techniques		x	x				
1.2. exhibits an antecedent-consequent logic system given a set of causes he matches corresponding consequences.	x	x			x		

1.3. arranges a given set of related tasks in a logical sequential order.

2) checks and corrects a given flow chart for complete and logical order by tracing an example of tasks through the flow chart (face validity test).

2.1. matches the existence of feedback in a given flow chart against the existence of one or more decision steps within the feedback loop.

2.2. determines the completeness of a set of sequential tasks by insuring that the input to a task plus the process (work of the task) yields the desired input to the next task along the flow chart path.

3) rearranges the logic flow in a given faulty flow chart so that the work flow accomplishes the overall goal by employing one or more of the following alternatives:

- add tasks (steps) to the flow.
- remove tasks (steps) from the flow.
- add decisions into the flow.
- remove decisions from the flow.

4) designates from a given flow chart and work breakdown structure those tasks which are milestones using one or more of the following:

- important tasks to the project (task such that when completed is a significant event).
- gathering point of several activities (a task in process of completion is an activity).

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simu-late
	x	x	x		x	
x			x		x	x
x			x	x		
x			x	x		x
			x		x	x
	x		x	x	x	x

- point of divergence for several activities.
- useful activity for control purposes.
- a somewhat arbitrary designation.

4.1. states the difference between activity (task in progress) and event (task completed).

5) creates a complete and logical flow chart including milestones having been given a work breakdown structure hierarchy.

c. Time Estimating

1) cites various reference materials or consultants where information is available on manpower/skill work rates.

2) estimates time required for task accomplishment given several tasks in a flow chart.

2.1. determines skills needed for given tasks.

2.2. determines an average ability level and work rates for a set of given skills.

2.3. estimates the zero activity time between work performed by several persons in a given task.

3) modifies the estimated time to a "best" time for the accomplishment of each task in a given flow chart by applying an effective resource application rate.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simu-iate
x	x					
			x		x	x
x	x	x				
		x		x	x	x
x	x			x		
x	x			x		
x				x		
		x		x	x	x

4) estimates total project time using some combination of the following:

- adds times for all tasks to determine a maximum possible time.
- adds times for those tasks which fall along various paths of the flow chart and determines the critical path.
- estimates various mission completion times using his own and others experience.

d. Resource Estimation and Scheduling

1) estimates the resources necessary for the accomplishment of each given task, detailing the resources under the following headings:

- skills needed (concurrent with time estimation mission).
- facilities needed.
- indirect costs needed.
- equipment needed.
- materials and supplies needed.
- specialized services (computer, printing, consultants) needed.

1.1. selects from a given list the resources that fall under the various headings.

1.2. lists several resources under each heading using either reference materials or consultants.

2) creates a project task-event calendar given a project start date, logic flow chart, task accomplishment times, and total project time.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simulate
		x			x	x
		x			x	x
x	x					
		x			x	
			x		x	x

3) combines the given task resource requirements with a project task-event calendar using nominal codes (this becomes the project task-event-resource calendar).

3.1. establishes a set of nominal codes (a color for a resource item) for a given set of resources.

4) adjusts the task events which are time flexible so as to accomplish a uniform rate in order to fully utilize the resources. A 'calendar' (project task-event-resource calendar) and a logic flow chart will be given.

4.1. determines the high and low counts for each resource item at various times across a given 'calendar.'

4.2. minimizes and spreads evenly the concomitant resource requirements by reducing the high counts of resource items and increasing the low counts for a given 'calendar."

4.3. determines the extent to which several types of skills can be combined into a single skilled person so as to utilize a single coded resource on the given 'calendar' instead of the several indicated skills.

5) establishes a resource commonality table to exclude common resource items from the list of resources included on a given 'calendar.'

6) calculates the lead time required for the acquisition of each type of resource or skill given.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simu-late
		x	x		x	x
		x				
			x		x	x
		x	x		x	
			x		x	x
x		x		x	x	
		x			x	x
	x				x	

e. Cost Estimates and Budget

1) gives examples and illustrations of various constraints imposed by federal, state, and local guidelines upon the budget, expenditures, and expenditure rates.

2) determines and lists the costs of skilled personnel using a given commonality table and resource 'calendar.'

2.1. determines those skill-persons required full time, part time, or consultant time by using skill coded resource items from a given 'calendar.'

2.2. determines from a given list of LEA personnel those skill-persons that, if available, could be incorporated into the project. (This availability would reduce the project costs).

2.3. cites reference materials or available consultants for information on salary/wage/fee rates and fringe benefits.

2.4. calculates the salaries/wages/fees for skill-persons in a given resource commonality table.

2.5. calculates the amounts for fringe benefits, personnel travel, and other personnel expenses which support the above salaries/wages/fees.

3) determines the costs associated with required facilities using a given resource commonality table.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simulate
x				x	x	
		x			x	x
		x			x	x
x				x	x	x
x	x	x		x	x	
		x			x	x
		x			x	x
		x			x	x

4) determines the indirect costs for the personnel using given facility and personnel cost document either by applying a percentage to total personnel costs or by specifying an amount.

5) establishes criteria for examining cost/benefit of rent versus purchase of equipment using a catalog.

6) determines costs associated with needed equipment using a given resource commonality table, an LEA availability statement and a cost/benefit criteria statement.

7) determines costs of materials and supplies using a given resource commonality table and a catalog containing cost-lot tables.

8) determines costs for contracted services using a given list (computer, printing/reproduction, consultants) from a resource commonality table, a LEA availability statement and reference or catalog materials.

9) combines into a single document (budget) the previously determined costs for a given project.

10) creates an expenditure plan for distribution of resources from a given total budget over the project time period by one or more of the following:

- along functional lines.
- by tasks or missions.
- by time periods under a function, task or mission.
- by time period (weeks, months).

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simulate
		x			x	x
x		x		x	x	
		x			x	x
		x			x	x
		x			x	x
			x		x	x
			x		x	x

f. Implementation and Gear Up

1) states the need for personnel and resources to be available on start-up date recognizing that lead time for acquisition of resources and the school year arrangement constraints the gear-up activities.

2) creates a plan for the gear-up of a project given a complete project plan.

2.1. determines acquisition dates for personnel and resources by applying lead time to first activity dates for the personnel and resources.

3) executes the gear-up plan by presenting the LEA personnel and business managers with recruitment and purchase instructions indicating the following:

- hiring personnel according to needed skills.
- arranging for facilities.
- purchasing (renting) equipment.
- purchasing materials.

4) negotiates with LEA Superintendent, functional administrators, and appropriate teachers for the purpose of developing project organization within existing LEA structure.

4.1. establishes interpersonal relationships with appropriate administrators and teachers in an attempt to get acceptance and support for the project.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simulate
x	x					
		x			x	x
			x		x	x
x						x
						x
						x

g. Initial Organization Activity

1) designs, sets up and initiates a project information system given project and gear-up plans.

1.1. examines elements from given projects and gear-up plans to determine decision points and information needs which could assist in the determination of orderly flow for plan completion.

1.2. designs the instruments to obtain the data which supports needed information.

1.3. establishes administrative routines and criteria for collection and analysis of the data instruments.

2) delineates responsibilities for personnel of the project by assigning specific work roles given a project plan.

3) organizes the staff into a control and communication hierarchy given a project plan and a statement of personnel responsibilities using pertinent elements from management functions of organizing and directing-motivating.

4) establish administrative routine, policies and procedures given a project plan, personnel responsibility statement and organizational chart.

h. Control

1) states that project control is a continuously recycling (iterative) process once project work has begun.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simulate
			x		x	x
		x			x	x
			x		x	x
		x			x	x
		x			x	x
			x		x	x
		x			x	x
x	x					

2) states that the initial step in project control is the operation of the project information system.

2.1. reads information reports, reviews related literature, observes project work in progress, and conducts project staff meetings.

3) compares actual performance of project work as indicated by information collected with the project task-event calendar and expenditure rate plans.

4) recognizes and lists deviations from the plan if a deviation exists.

5) recognizes and indicates the significance implied by a given deviation between project progress and project plans.

5.1. develops a rationale for the interrelationships of performance, schedule, and costs.

5.2. establishes and lists a set of values and criteria to judge significance and to set priorities.

6) develops alternative courses of action for correcting a significant deviation from the plan by:

- modifying the trade-off relationships of performance, schedule, and cost within the plan.
- modifying the information system to more accurately describe the operations.
- modifying the plan so as to reduce the difference of the plan to the operations.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simulate
x	x			x		
x						x
		x			x	x
x	x	x			x	x
x		x			x	x
x		x			x	x
x		x			x	x
x		x			x	x

- modifying the goal or missions of the project so as to allow accomplishment of the project realizing contract constraints.

6.1. establish a set of criteria for the selection of an alternative.

7) decides on the alternative to reduce the significant deviation from the plan.

7.1. projects and cites the consequence of each alternative course of action.

8) creates a status and action report listing the information, alternatives, and the decision. (This report is distributed to the contracting agency for information and possible approval and to project personnel to inform them of the changes).

9) creates a plan for the implementation of the decision given a decision about an alternative using project planning techniques.

10) Implements a decision, once it is made, by initiating the first step followed by the subsequent steps in the plan.

10.1. Focuses particular attention on the implementation of the decision through the recycling process of control.

11) identifies the last activity of the project task-event calendar indicating a completion of the overall goal.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simulate
x		x			x	x
x				x		x
x		x		x	x	x
		x			x	x
x		x			x	x
x	x			x		
x	x			x		
x	x			x		

	BEHAVIORAL EVALUATION TECHNIQUES						
	Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simu-late
i. Project Termination							
1) prepares a structural outline for a general final report.	x	x	x		x	x	x
1.1. Cites that copies must be available for filing in the LEA, contracting agency and other dissemination sources such as ERIC when appropriate.	x	x			x		
2) lists various alternatives for the disposition of project personnel.		x	x		x	x	x
3) develops a general plan on procedure for release of the more common type of project facilities and equipment.	x	x	x		x	x	x
4) Creates a list of criteria for sorting of project records into those which are to be retained or removed.	x	x	x		x	x	
5) Lists the appropriate elements of a project time related history report for the LEA as an aid to future projects.		x	x		x	x	

2. Executive Orientation Seminar Trainee

Two basic tasks performed by LEA executives in connection with project management were identified.

a) Incorporation of a project management capability in his LEA.

b) Aiding the project director in planning and operating a project.

The identification of these tasks led to the development of the behavioral objectives for the Executive Orientation Seminar. The process of development for these behavioral objectives was similar to that developed for the Project Directors Seminar in that an action verb indicating what the trainee will be doing and the conditions under which he is to perform is included. Associated with each behavioral objective are the various performance measurement criteria which seem appropriate and are defined previously in Section B.

Appendix C is a table summarizing the performance measurement criteria for the Executive Orientation Seminar. The table allows for the viewing of groups of behavioral objectives associated with performance measurements providing a tool to trade-off instructional schemes and performance measurement criteria.

In the following behavioral objectives the trainee:

1) defines the concept project by stating the six characteristics of a project.
2) states the relationship of general management principles to project management.
3) cites examples of how the project management system can and has been used successfully in industry and government.
4) cites examples of how the project management system can and has been used successfully in the field of education.
5) states the important advantages for and limitations of using a project management system.
6) states where project management as a discipline can assist in the LEA operation.
7) creates a plan for implementing a project management system into at least one aspect of a given LEA situation.
8) cites the specific information and guidance input needed to aid the project director in the planning and operation of a project.
9) cites potential conflicts existing between the LEA structure and project activity which crosses function organizational lines.
10) states the support and assistance which could aid the project director in solving potential conflict.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simu-late
x	x	x		x		
x		x		x		
x		x		x	x	
x		x		x	x	
x	x	x		x	x	
		x		x	x	
		x			x	x
x		x		x	x	
x		x		x	x	
x		x		x	x	

11) states locations where information and help is available for assistance in project management.

BEHAVIORAL EVALUATION TECHNIQUES						
Mental Verb	Test	List	Ind. Chart	Group Verb	Group Report	Simu-late
x		x		x	x	

APPENDIX A

LIST OF TRAINING FILMS RELATING TO PROJECT MANAGEMENT

TITLE	SOURCE	COMMENTS
1. PERT/COST (MN-9704B)	U. S. Government Film Services Du Art Film Laboratories 245 W. 55th Street New York, New York	16 mm 30 min., C/S Purchase $93.00
2. Management Reports - PERT (MN-9704-C)	Bureau of Naval Weapons U. S. Navy	16 mm 10 min. C/S
3. PERT in Pre-Award (MN9704-D)	Bureau of Naval Weapons U. S. Navy	16mm 15 min. C/S
4. Introduction to PERT (North American Aviation Co.)	General Film Laboratories 1546 Argyle Hollywood, California	16mm 15 min. C/S (purchase $83.00)
5. PERT/COST	Industrial Education Films, Inc. 196 Nassau Street Princeton, New Jersey	16mm 27 min. C/S R-P
6. MAP for Project Control	Industrial Management Society c/o Modern Talking Picture Services 160 East Gran Chicago, Illinois 60611	16mm 17 min. C/S $9.50 rental
7. The Planning Function in Management	American Management Assn. 1515 Broadway New York, New York	16mm 58 min. B/W ($60.00 Rental)
8. PERT Applications and Principles	American Management Assn. 1515 Broadway New York, New York	16mm 39 min. B/W $60.00
9. Process of Management (ARMCO)	Wayne State University Audio-Visual Center Detroit, Michigan 48202	16mm 25 min. $4.50

APPENDIX A (CONT.)

TRAINING FILMS RELATING TO PROJECT MANAGEMENT

TITLE	SOURCE	COMMENTS
10. Controlling (ARMCO)	Wayne State	16mm 40 min. B/W $4.50
11. Planning (ARMCO)	Wayne State	16mm 35 min. B/W $4.50
12. Theory of Management Development	University of California Public Film Rental Library University Extension 2223 Fulton Street Berkeley, California	16mm 30 min. B/W $7.50
13. Systems Analysis	Standard Register Co. Dayton, Ohio	No Data

APPENDIX A (CONT.)

Film Descriptions

Map for Project Control*

Much attention has been given to new management techniques for controlling projects. PERT, CPM and MAP are only a few of the names which describe specific applications of these techniques. This film demonstrates how MAP, using critical path mathods, can be used to control small scale projects without the use of computing equipment. The film describes the methods used in constructing arrow diagrams and how to calculate the scheduling data for the activities within a project. An example of the technique and its uses is shown through the application of MAP to a project concerning modification of maintenance facilities.

50

PERT COST*

The film was produced to show project managers, engineers and controllers how to apply PERT to any complex project. It demonstrates the planning and control framework of the work breakdown, the project network, and the account code structure used to generate time and cost status. It shows specific examples of information generated by computer printouts, summary reports and graphic displays. Most important, it explains the step-by-step procedures in applying PERT.

* From: A Notebook of Films for Engineering Education, National Academy of Engineering, 2101 Constitution Avenue, N. W., Washington, D. C. 20418

APPENDIX B

SUMMARY: BEHAVIORAL OBJECTIVES PERFORMANCE MEASUREMENTS CRITERIA FOR PROJECT DIRECTORS SEMINAR

BEHAVIORAL OBJECTIVES	Individual Verbal Response (ORAL Answer)	[illegible]	[illegible]	Individual Written LIST of a Verbal Answer	Individual Written Symbolic Answer (SELF CHART)	Group Verbal Response Interaction (GROUP VERBAL)	Group Written Verbal and Symbolic Answer (GROUP REPORT)	Group Role Playing Response (SIMULATE)
PROJECT DEFINITION								
A1			×			×		
2			×			×		
3		×			×			
4	×		×		×	×		
5				×	×	×		×
WORK FLOW								
B1				×		×		
1.1		×	×					
1.2	×	×			×			
1.3		×	×	×		×		
2	×			×		×		×
2.1	×			×	×			
2.2	×			×	×			×
3				×		×		×
4		×		×	×	×		×
4.1	×							
5				×		×		×
TIME ESTIMATING								
C1	×	×	×					
2			×		×	×		×
2.1	×	×			×			
2.2	×	×			×			
2.3	×				×			
3			×		×	×		×
4			×			×		×
RESOURCE EST. & SCH.								
D1			×			×		×
1.1	×	×						
1.2			×			×		
2				×		×		×
3			×	×		×		×

APPENDIX B (CONT.)

BEHAVIORAL OBJECTIVES	Individual Mental Formulation of the VERBAL Answer	Individual Discrimination Between Alternatives (TEST)	Individual Written LIST of a Verbal Answer	Individual Written Verbal/Symbolic Answer (SELF CHART)	Group Verbal Response Interaction (GROUP VERBAL)	Group Written Verbal and Symbolic Answer (GROUP REPORT)	Group Role Playing Response (SIMULATE)
3.1			x				
4				x		x	x
4.1			x	x		x	
4.2				x		x	x
4.3	x		x		x	x	
5			x			x	x
6		x				x	
COST EST. & BUDGET							
E1	x				x	x	
2			x			x	x
2.1			x			x	x
2.2	x				x	x	x
2.3	x	x	x		x	x	
2.4			x			x	x
2.5			x			x	x
3			x			x	x
4			x			x	x
5	x		x		x	x	
6			x			x	x
7			x			x	x
8			x			x	x
9				x		x	x
10				x		x	x
IMPLEMENT & GEAR-UP							
F1	x	x					
2			x			x	x
2.1				x		x	x
3	x						x
4							x
4.1							x
INITIAL ORGANIZATION							
G1				x		x	x
1.1			x			x	x

APPENDIX B (CONT.)

BEHAVIORAL OBJECTIVES	Individual Mental Formulation of the VERBAL Answer	Individual Discrimination Between Alternatives (TEST)	Individual Written LIST of a Verbal Answer	Individual Written Verbal/Symbolic Answer (SELF CHART)	Group Verbal Response Interaction (GROUP VERBAL)	Group Written Verbal and Symbolic Answer (GROUP REPORT)	Group Role Playing Response (SIMULATE)
1.2			x		x	x	x
1.3		x			x	x	x
2		x			x	x	x
3			x		x	x	x
4		x			x	x	x
CONTROL							
H1	x	x					
2	x	x		x			
2.1	x						x
3		x			x	x	x
4	x	x	x		x	x	x
5	x		x		x	x	x
5.1	x		x		x	x	x
5.2	x		x		x	x	x
6	x		x		x	x	x
6.1	x		x		x	x	x
7	x			x			x
7.1	x		x	x	x	x	x
8			x		x	x	x
9	x		x		x	x	x
10	x	x		x			
10.1	x	x		x			
11	x	x		x			
PROJECT TERMINATION							
11	x	x		x			
1.1	x	x		x			
2	x	x		x			
3	x	x		x			
4	x	x		x			

APPENDIX C

SUMMARY: BEHAVIORAL OBJECTIVES PERFORMANCE MEASUREMENT CRITERIA FOR EXECUTIVE ORIENTATION SEMINAR

BEHAVIORAL OBJECTIVES	Individual Mental Formulation of the VERBAL Answer	Individual Discrimination Between Alternatives (TEST)	Individual Written LIST or a Verbal Answer	Individual Written Verbal/Symbolic Answer (SELF CHART)	Group Verbal Response Interaction (GROUP VERBAL)	Group Written Verbal and Symbolic Answer (GROUP REPORT)	Group Role Playing Response (SIMULATE)
1	x	x	x		x		
2	x		x		x		
3	x		x		x	x	
4	x		x		x	x	
5	x	x	x		x	x	
6			x		x	x	
7			x			x	x
8	x		x		x	x	
9	x		x		x	x	
10	x		x		x	x	
11	x		x		x	x	